

## Conference Paper

# Pholidosis Abnormalities and Injuries in the European Pond Turtle (*Emys orbicularis*) in the Conditions of the Khopersky Nature Reserve

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## Abstract

Pholidosis abnormalities and injuries were studied through 194 specimens of European pond turtle (*Emys orbicularis*) in the Khopersky nature reserve (Voronezh Province, Russia) in 2008, 2009 and 2011. Six types of abnormalities (on the carapace only) were detected. The occurrence of individuals with all types of abnormalities, the partial occurrence of various abnormalities and the average number of abnormalities per individual were analyzed. Most individuals showed signs of predator attack, mostly on the carapace and tail. During winter hibernation, animals with limb injuries were noted.

**Keywords:** European pond turtle, *Emys orbicularis*, pholidosis abnormalities, Khopersky nature reserve.

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## 1. Introduction

Most studied populations of the European pond turtle, *Emys orbicularis* (Linnaeus, 1758), demonstrate deviations from the standard pholidosis pattern [1–4, 8–15]. These manifest themselves in changes to the shape or size of the keratinous scutes, the presence of additional scutes, the absence of one or more scutes, the incomplete separation of scutes or their connection [7].

The purpose of the investigation is to study pholidosis abnormalities and injuries in the European pond turtle (*Emys orbicularis*) in the Khopersky state nature reserve (Voronezh Province, Russia).

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## 2. Methods

Field investigations were carried out in Khopersky reserve in the following periods: 6-12 June, 22-26 August and 7-11 November 2008; 31 May – 12 June and 8-12 November 2009; and 16 June 2011. In total, 194 specimens of European pond turtle were studied: 167 alive (mainly during the period of egg laying in June and during the formation of hibernation concentrations in November), which were subsequently release in the same place, and 27 after death. The standard scheme for the description of pholidosis in *E. orbicularis* was used [5].

## 3. Results

Six types of pholidosis abnormalities were detected in the European pond turtle population in Khopersky reserve (on the carapace only) (Fig. 1). They are: a) accessory vertebral scutes, b) accessory costal scutes, c) accessory marginal scutes, d) absence of some marginal scutes, e) duplication of nuchal scute, and f) absence of nuchal scute.

Abnormalities were founded in 15 of the 194 specimens. Thus, the occurrence of individuals with abnormalities [6] was 7,7%. A similar index was detected in turtles from Brandenburg, Germany (7.7%) [15] and in the south of the steppe zone in Ukraine (7.8%) [10]. A higher rate was found in Polesye in Belarus (13.5%) [9], in Southern Hungary (14.2%) [4], in Genf, Switzerland (23.8%) [11], and particularly in Western Poland (54.0%) [13]. Cordero et al. (2008) mentioned that this index has a very high level of variability among Iberian populations of *E. orbicularis*: on the whole, it varied between 3% in Doñana National Park (SW Spain) to 69% in Porriño (NW Spain). Saçdanaku et Haxhiu (2016) reported a low level of abnormalities in the turtles of Vlora Bay, Albania – 3.5%.

The partial occurrence [6] of the various pholidosis abnormalities in the European pond turtle population of Khopersky reserve are presented in Table 1. Only one type of abnormality was detected in 12 specimens, while the simultaneous occurrence of two types was found in 3 specimens in the following combinations:

- Accessory vertebral scutes + accessory marginal scutes;
- Accessory vertebral scutes + absence of some marginal scutes;
- Accessory vertebral scutes + accessory costal scutes.

The average number of abnormalities per individual [6] was 1.2.



**Figure 1:** Types of pholidosis abnormalities among European pond turtles in the Khopersky reserve: a) accessory vertebral scutes; b) accessory costal scutes; c) accessory marginal scutes; d) absence of some marginal scutes; e) duplication of nuchal scute; f) absence of nuchal scute.

**TABLE 1:** Partial occurrence of various pholidosis abnormalities in European pond turtles in the Khopersky reserve.

Nº	Type of abnormalities	Number of specimens with abnormalities	Partial occurrence of abnormalities, %
1	Accessory vertebral scutes	6	3.1
2	Accessory costal scutes	2	1.0
3	Accessory marginal scutes	5	2.6
4	Absence of some marginal scutes	2	1.0
5	Duplication of nuchal scute	2	1.0
6	Absence of nuchal scute	1	0.5

Injuries were connected with predator pressure. Most individuals showed signs of vertebrate predator attack, mostly on the carapace. During hibernation, animals with

limb damage were registered. 22 specimens from the 167 living samples (13.2%) had damaged tails.

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